"Airspace" Surveillance Transformation, Stovepipe to Service Oriented Architecture (SOA)

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Detect the Difference

Problem Statement

- There exists an overwhelming demand for surveillance information by many agencies that operate airspace command and control nodes.
- Today's Approach
  - Replicate the information
  - Route it to each consumer - dedicated point-to-point circuit
- Obvious Problem
  - Aggregate cost of duplicating the surveillance information
  - Increasing operations and maintenance of the service

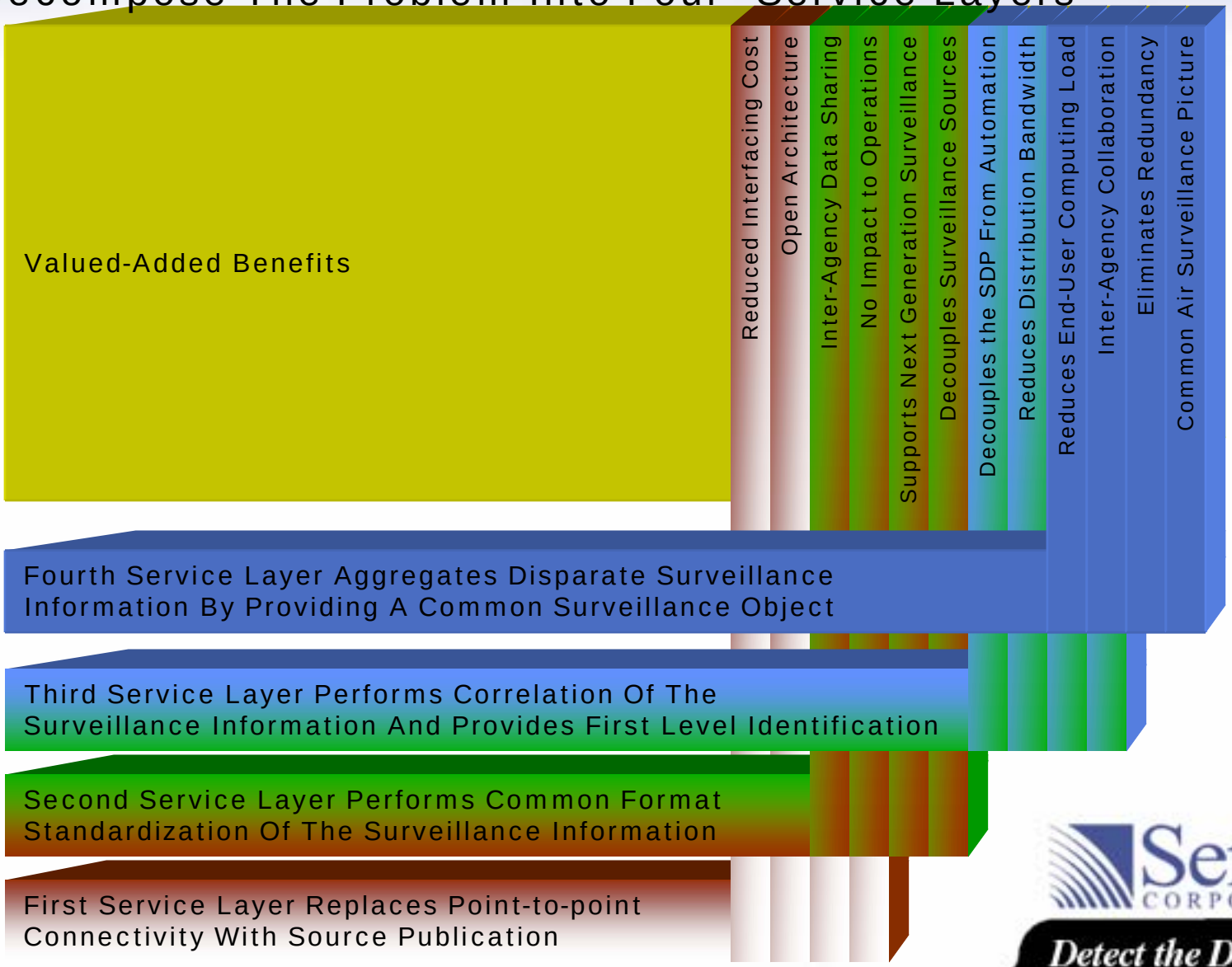
"How can the Communities Of Interest realize significant cost savings, information sharing, and scalability now, while providing a coherent migration path to the NGATS?"

The Vision

- Transition The Surveillance Assets Observing The Airspace From Closed, Point-to-Point Connectivity To A Service Oriented Architecture (SOA)
  - Provide an open, standards-based surveillance format
  - Provide a flexible and scalable infrastructure
  - Decouple surveillance sources from technology from data processing from automation
  - Eliminate the duplication of services within Communities Of Interest (COI)
  - Rapidly enables technology refresh and new services deployment with reduced impacts and at lower cost
- Significant Research And Investigation Into The SOA Concept Is Ongoing
  - JPDO's Next Generation Air Transportation System (NGATS)
  - FAA's System Wide Information Management (SWIM)
  - DoD's Global Information Grid (GIG)
  - MIT/LL Surveillance Data Network (SDN)
- The following will present a framework for transforming today's CONUS stove-piped "Airspace" Surveillance Assets to a SOA.

Surveillance Transformation Approach

- Decompose The Problem Into Four "Service Layers"



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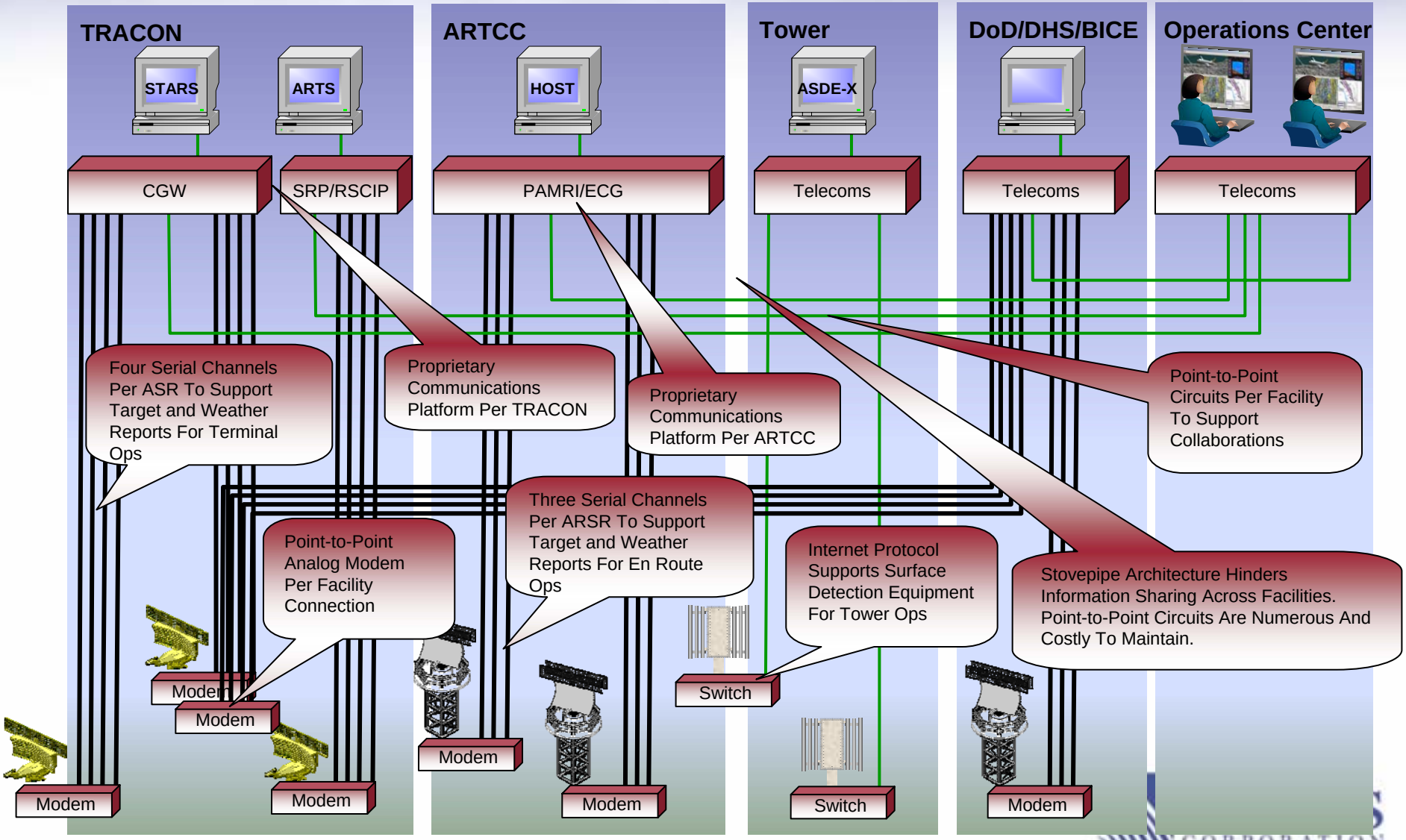
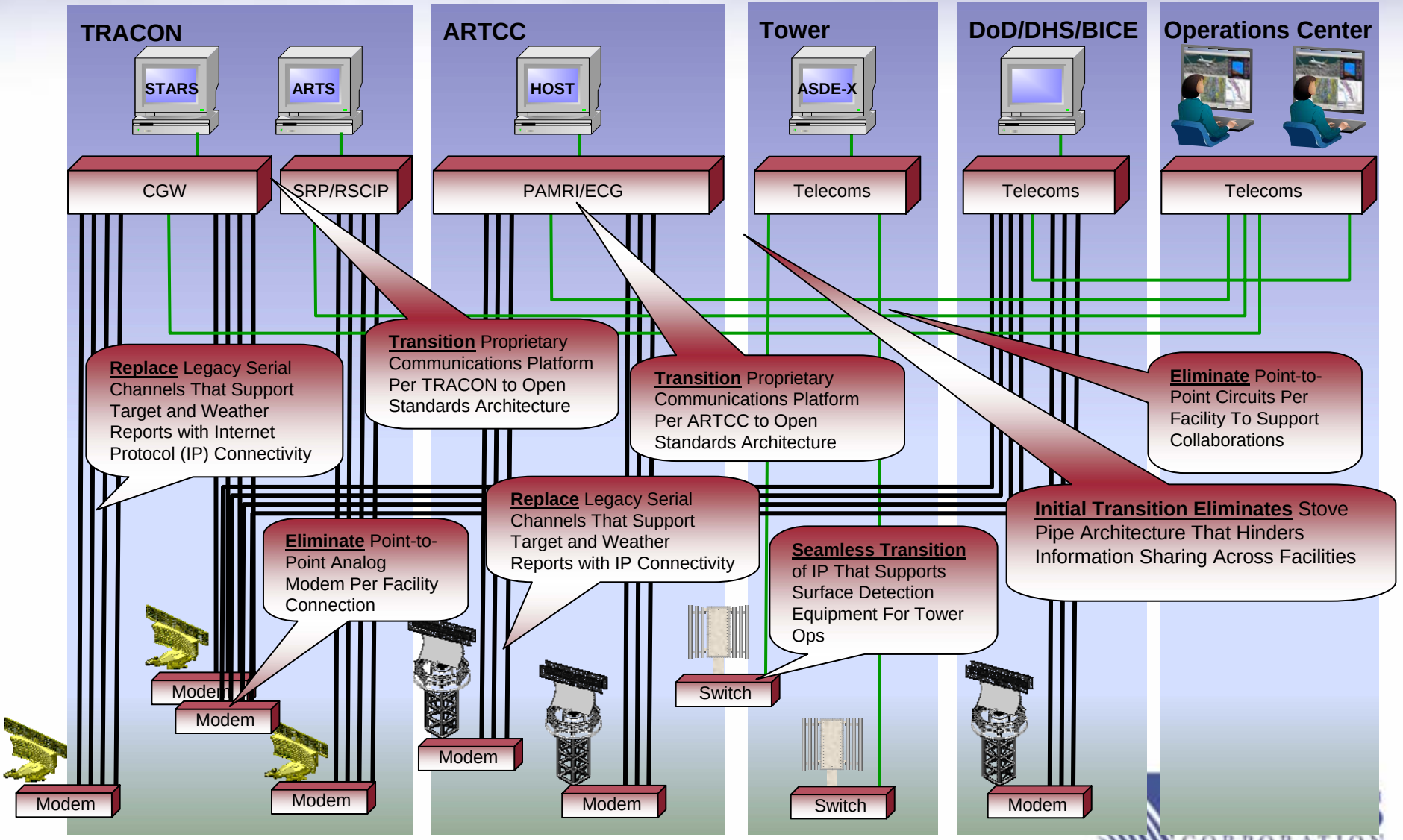
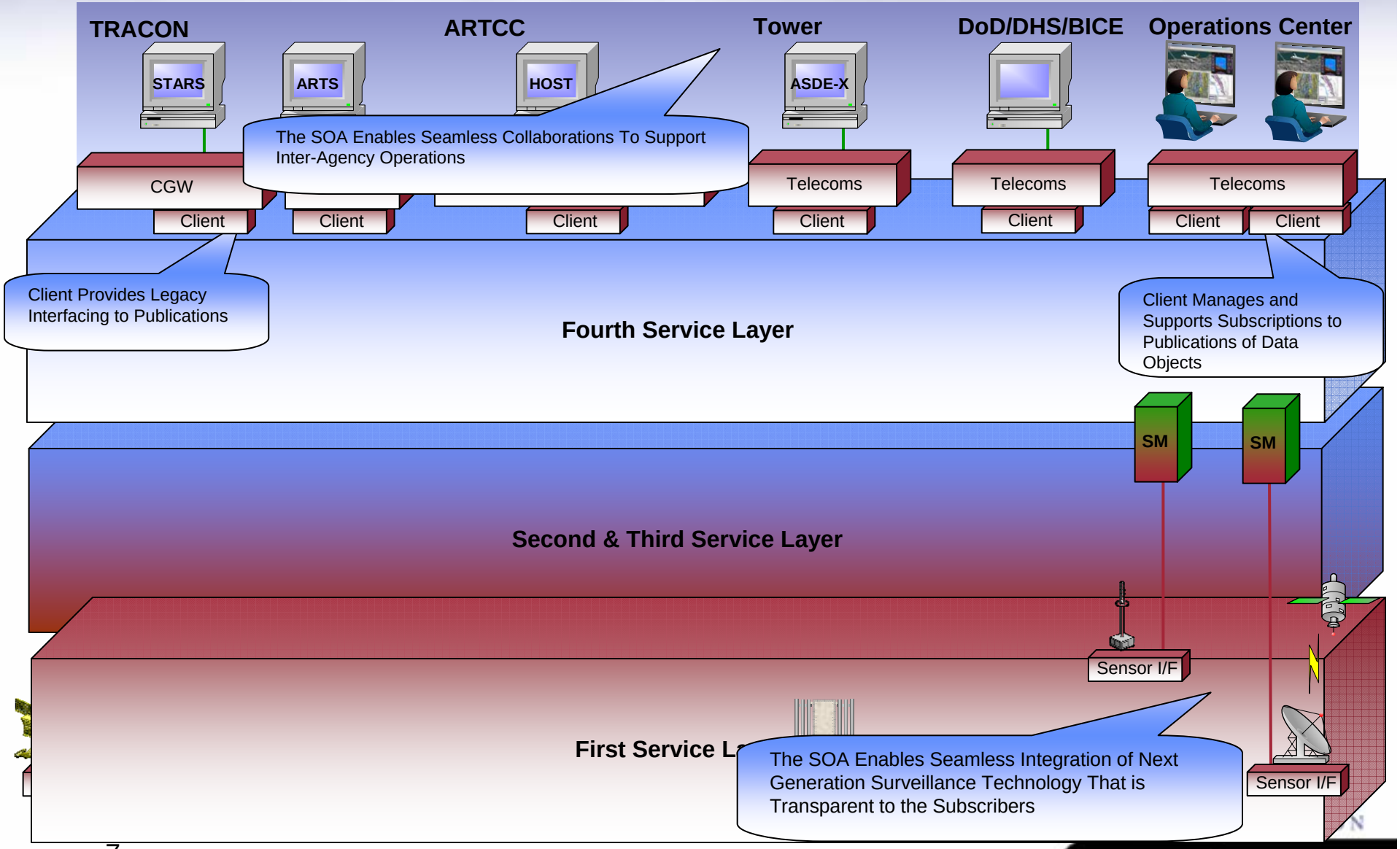
Overview of Today's CONUS Surveillance Information



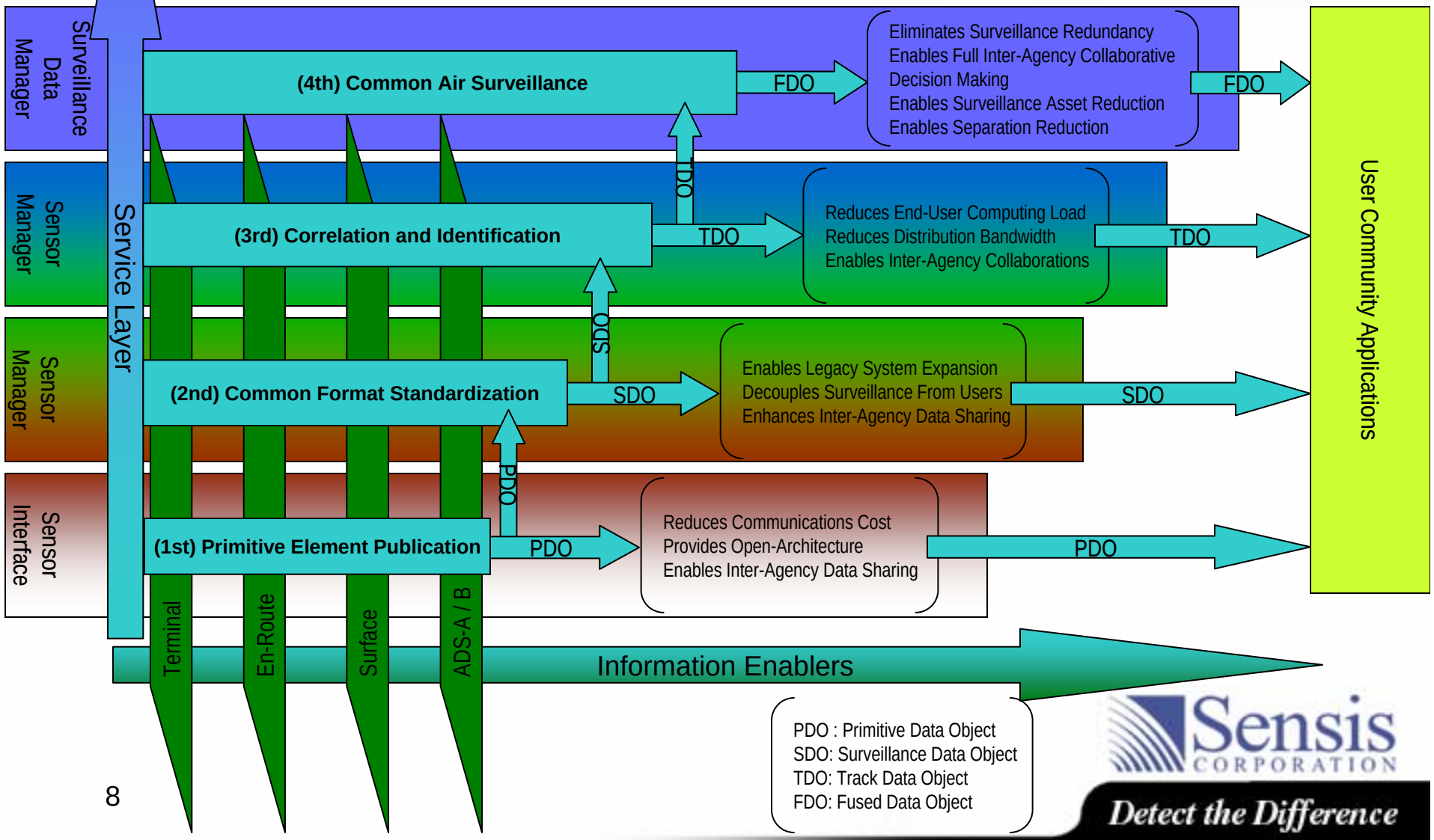
Notional CONUS Surveillance Transformation



Conceptual CONUS Transformation Implementation



Surveillance Service Layer Summary



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Conclusions

- Key Questions Addressed
  - Ability To Provide A SOA Without Impacting Current Services
  - SOA Enhances Critical Service Delivery And Processing Architecture
  - Elimination Of Domain-specific Operations, And Duplication Of Services
  - Decoupling Surveillance Sources From Technology From Data Processing From Automation
- Benefits Of A SOA
  - Enable Systems To Respond Quickly And Cost-effectively
  - Promotes Reuse Of Existing System/Subsystem Assets
  - Provides Inter-operable, Reusable Building Blocks, Thus Providing Dynamic Solutions
  - Enables Information, Identity, Access, And Broker Management Services

Surveillance Transformation Benefits

- Today's Costs
  - Users Access Cost Is Linear
  - User Interface Costs Are Exponentially Increasing
- Today's Service Latency
  - Static And Deterministic
  - Dictated By Architecture
- Today's Vulnerability
  - Single Point Of Failure
  - No Alternatives
- Today's Security
  - Defacto (Dedicate P-to-P)

- SOA Cost Savings
  - User Interface Cost Is Now Linear
  - User Access Cost Remains Linear
- SOA Latency
  - Service Based Assignment
  - Dynamic Assessment
  - User Dictates Need
- SOA Reduces Vulnerability
  - Service Resilience
  - Dynamic Discovery
- SOA COTS Security
  - User/Role Based Access
  - Secure Key Authentication
  - Encryption

Relevant Activity

- NGATS Test Bed (NASA GRC/Sensis)
  - Cleveland Regional Area
  - Service-Oriented Architecture For Information Sharing
  - Standardized Information Interface
  - Role-Based Access Control
  - Surveillance Information Management
  - Network-Enabled ATM
  - Collaborative Decision Support